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Knowledge Management

PIMS (PfP Information Management System)

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CLASSIFICATION: **UNCLASSIFIED**

Outline (PIMS Knowledge Management System)

- PIMS Overview
- What – PIMS Theory Of Knowledge
- How - PIMS Design Rules
- Examples
- Q&A

Mission of Partnership for Peace (PfP)

- Engage with Partner Nations to Increase Defense Cooperation
- Improve Regional Stability and Security
- Reduce Risk of Conflict and Focus on GWOT
- Partner Nation Capacity Building in support of Transformation
- Further Democratic Values and Encourage Democratic Control of the Armed Forces
- Improve the Relationships and Dialog between NATO and the Partner Nations
- Improve Partner Defense Interoperability with NATO
- Support the NATO-PfP Exercise Program
- Continue to Adapt to Varying Partner Needs, Interests, Capabilities, and Regional Agendas!

Mission of PIMS

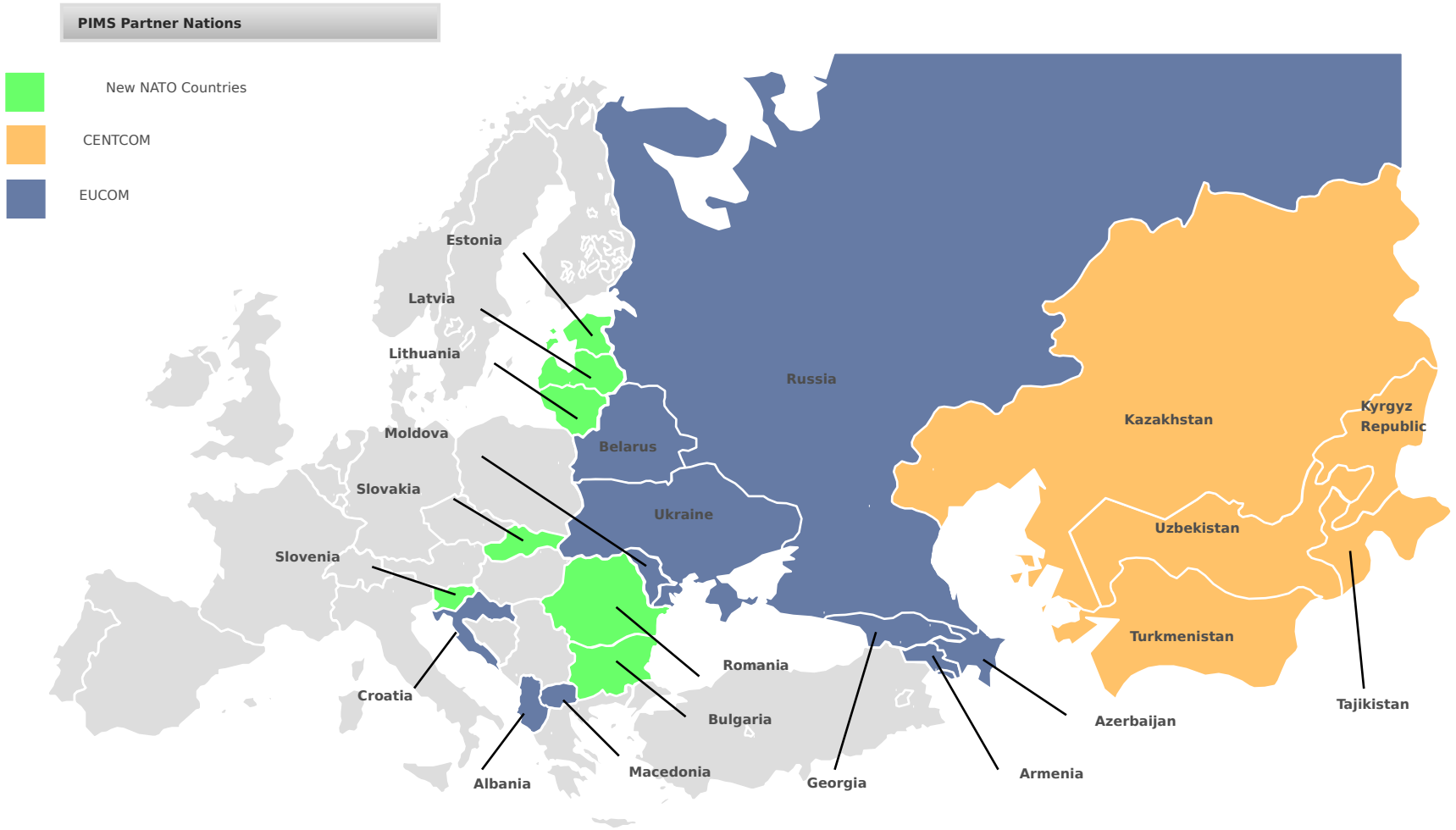
Strategic

- Align Closely with and support the NATO-PfP Program
- Strengthen U.S. to Partner Nation Relationships
- Shape Defense Security Cooperation
- Support U.S. Bi-lateral and Regional Objectives
- Facilitate Cooperative Development Efforts
- Support the Global War on Terrorism (GWOT)

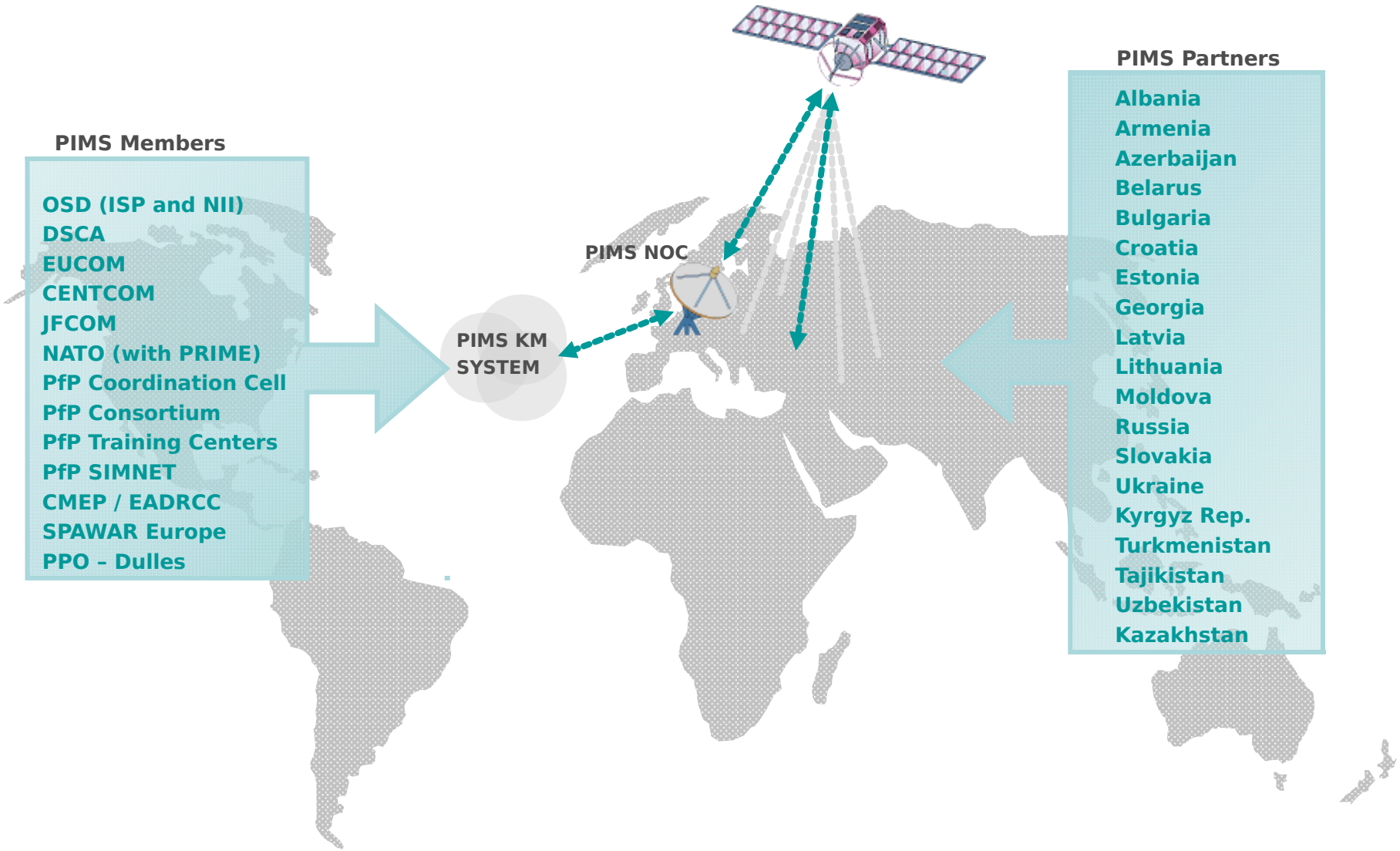
Operational and Technical

- *PfP Knowledge Grid (PKG)*
- *PfP Collaborative Web Services (PKWS)*
- Provide a Common Interoperable IT Infrastructure
- Facilitate Collaboration and Information Sharing
- Host new and dynamic cooperatively developed content
- Support Events - Exercises, Conferences, and Workshops

PfP and PIMS Countries



PIMS Members and Partners



WHAT

GOALS - Strategic Direction

- PIMS as the Knowledge Management (KM) System for NATO-PfP
- PfP systematically use PIMS to create, capture, share, and leverage Knowledge needed by PfP to be successful
- Transform PIMS into a **KM System**:
  - Collaboration and Information Sharing Tools
  - Connecting People to People
  - Communities of Practice
  - Easily Sharable and Dynamic Content
  - Content Management System
- Embedded Analytics (Measure, evaluate, and evolve)
- Hardest Challenge is the Cultural One
- Managing Knowledge provides a High ROI

Use PIMS as the Tool to Transform NATO-PfP into a **Knowledge-Based Organization**

What is Knowledge Management (to us)?

Responsibility for effectively using available resources, planning the employment of, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions

- JCS Pub. 1,

Knowledge Management is

Command and Control

in the Information Age

Our Theory of Knowledge (as it applies to PIMS)

Representational Model

“What is the technology and process we want to build and how can it be encoded and by when?”

Driver: Technology

Interaction Model

“How and why, in the course of their interactions, are people enabled to achieve and maintain a mutual understanding toward shared goals?”

Driver: Shared Context

Representational Model

- Knowledge is a “good” or a “thing”
- Documents are representations and source of Knowledge
- Document Warehouses are Repositories of Knowledge
- People gain Knowledge through finding the right document
- Focus on predictive identification of Knowledge within a pre-identified process
- Optimization of Knowledge process is the framework

The primary focus in a representational model is:

Cataloging, Retrieval, Process Definition

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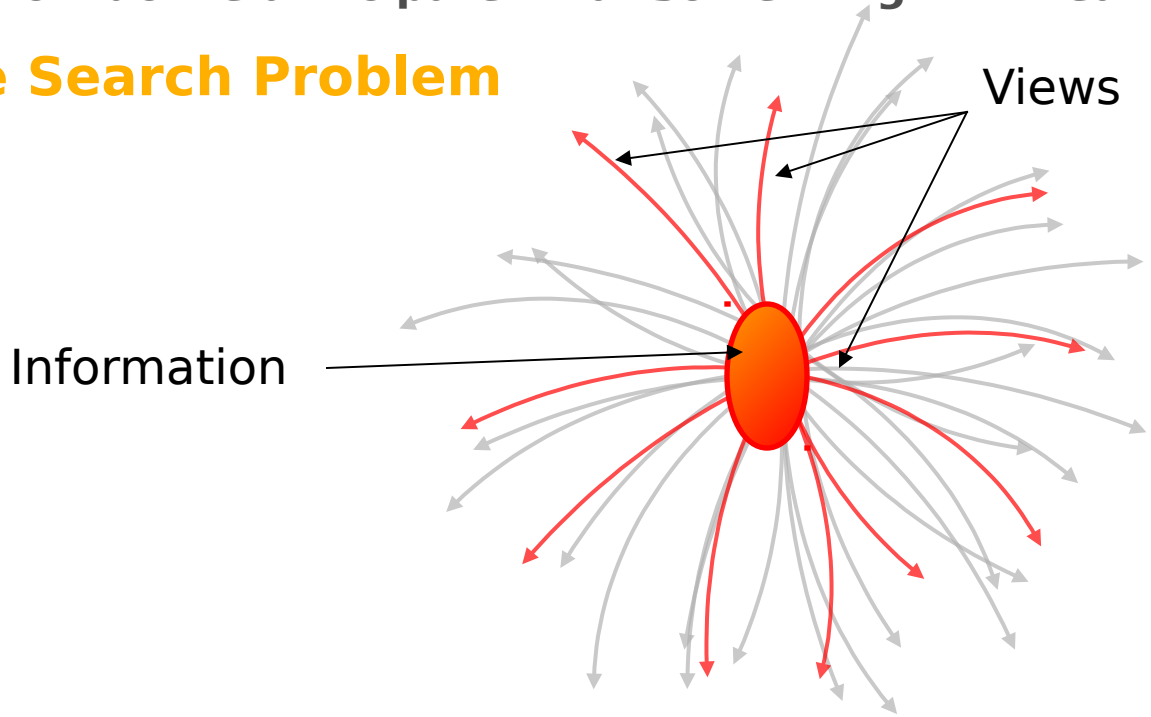
Limits of the Representation Model

1. How do we find what we need?
2. How do we know what it means?
3. How do we anticipate what something will mean tomorrow?

The Search Problem



Orthogonality

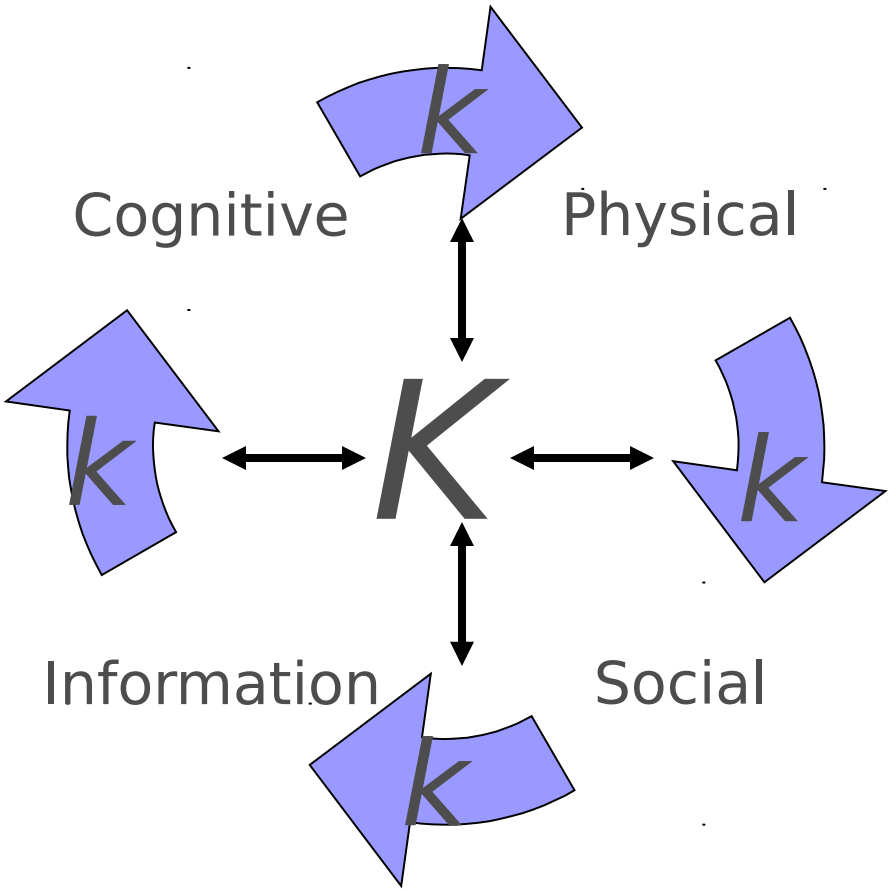
Rigid hierarchically defined Ontologies, Taxonomies and Processes are too brittle and not agile enough to adapt to a potentially infinite number of orthogonal views for a given piece of information

Limits of the Representation Model

- Speed of new information – Can’t keep up
- Harvesting of documents is primary driver
- Data Noise
- Incomplete
  - What you are supposed to do (explicit models)
  - What you need to know to get it done (implicit models)?
  - What will you need to do tomorrow?
  - How does Knowledge change over time?
  - How does Knowledge change in a different context?

A prescriptive model defined by Technology Experts

Knowledge Management Domains



Interaction Model

- Knowledge is both a “good” and a “flow”
- Knowledge is dynamic and unpredictable
- People are the source of Knowledge
- Information transactions form basis of understanding Knowledge
- The higher the number of transactions and participants in exchange the more valuable the model (Moore's law)
- Intelligence about transactions informs where Knowledge lives
- Focus on derivative models for Knowledge trend identification
- Interoperability and Extensibility of Knowledge interactions are framework

The primary focus in a interaction model is:

Transactional Analysis!

Advantages of Interaction Model

- Moving toward a “Just in Time” Knowledge supply chain
- Approach to Knowledge is dynamic and adaptive
- People-centric as opposed to information-centric
- Better more explicit models of Knowledge
  - meme tracing, reputation networks, etc.
- Intelligence about Small Worlds and Expertise (six degrees)
- Ability to manage institutional Intellectual Capital
- Focus on trend identification and probability vs. outcomes and predictability (e.g. money ball)

An adaptive model defined by Subject Matter Experts at the edge

From Representation to Interaction

To summarize, the enduring principles of command and control are not about who accomplishes what tasks, nor how to accomplish them, but the nature of these tasks themselves.

Traditions are often about responsibilities for how tasks are distributed (roles) and about how tasks are performed. They should not be presumed to be enduring.

- Power to the Edge, p17

Focusing on the tasks themselves and interactions in the four domains allows us to be adaptive and agile in an environment of unpredictable dynamic and changing circumstances

The Challenge

- From Representation to Interaction
- Interaction is a Superset of Representation
- The goal is a modular transactional framework
  - A network of networks
  - Built to be in turn absorbed by a network
- Not a system of systems

HOW

Design Rules Approach to KM - Structure

Categories of design information

- Architecture
  - Capabilities Driven
  - “Where architecture tells what happens - implementation tells how it is made to happen" Blaauw
- Integration Protocols and Testing Standards
  - Procedures for assembly, measurement conformity to design rules and comparative analysis
- Interfaces
  - Detailed Descriptions of interactions

Design Rules Approach to KM - Method

Iterative Process

- Design rules stage
- Independent parallel activity stage
- System integration and testing stage

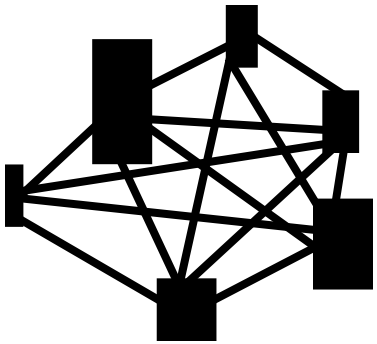
- KM systems are grown and evolved
- Design activity must be agile and adaptive
- Continuous improvement lifecycle
- No end state!

At the beginning there is an incomplete understanding of the problem space

Design Rule 1 – Be Modular

- Evolving and Emerging Modular designs

" A ***decentralized*** search by many designers for valuable ***options*** embedded in the ***modular operators***"



Black Boxes

``Plan to throw one away; you will, anyhow.''
Fred Brooks, The Mythical Man-Month, Chapter 11

The Modular Operators

Splitting

- Through splitting, modules can be subdivided

Substituting

- Through substitution, modules can be improved

Augmenting

- Through augmentation, modules can be created

Excluding

- Through module exclusion, new systems can be tried

Inverting

- Through inversion redundant, modules can be consolidated

Porting

- Through porting, systems can be linked through common modules

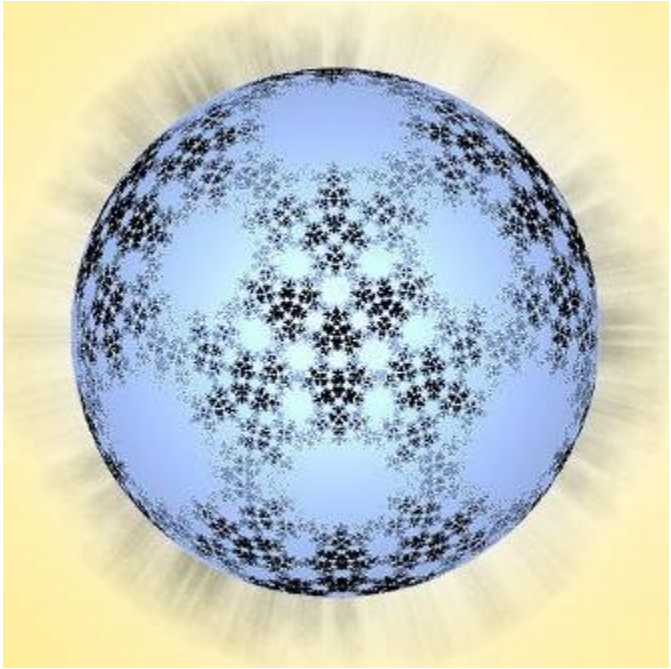
Design Rule 2 - Simplify!

$$G\mu\nu = 8\pi\kappa T\mu\nu$$

Complex Problems require simple solutions!

Design Rule 3 - Embrace Diversity

- Diversity is a source of strength
  - Niche needs
  - Needs defined at the edge
- Plan for heterogeneity
- Self Similarity



The emphasis is on synchronizing and integrating unique needs and capabilities into the whole

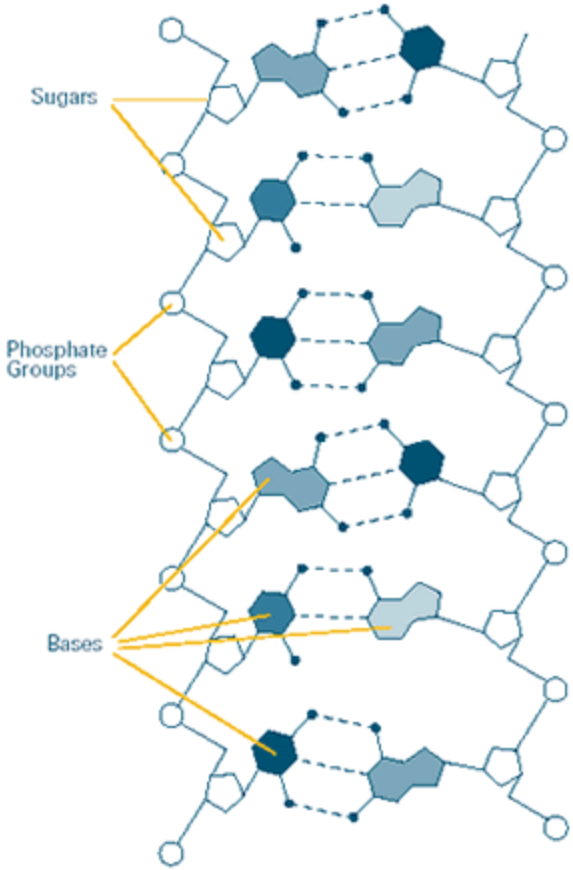
Design Rule 4 - Be Standards Driven & Self Descriptive

- Find the relevant international standard in your marketplace and try to comply.
- This will enforce good architecture and keep your product on track when your customers will want it to integrate with their legacy software.
- You know they will want you to integrate.

- Six laws of software

But even more important…

Design Rule 4 - Be Standards Driven & Self Descriptive



"The big thing isn't turning out to be industry schemas, but the fact that you have this ***self-describing*** thing, this is what I can learn about it, and I can reason on it in a programmatic way by pulling it up into an object."

-Quentin Clark, director of program management for WinFS

Design Rule 5 - Embrace and Extend

- Legacy Systems are legacy systems for a reason
- Hide legacy system complexity
- Don't re-write – Wrap in a self descriptive layer
- Plan for Heterogeneity and Diversity

Design Rule 6 - Post and Smart Pull

- Push information distribution decisions **to the edge**
- Allow the creators and consumers of information to decide what information means to them
- The power of RSS, Pub-Sub (Event Streams)

A Transactional Framework

- Asynchronous XML Messaging (convergent self descriptive)
- Services orientation (modularity)
- Data Centric (rules based data handling)

Allows for the creation of derivative markets for information

The analysis of which emerges new Knowledge

EXAMPLES

Example Technology - Groove

- Presence and Awareness
  - Red/Blue Tracking for information
- Post and smart pull notification engine
- Security and Network Transport
- Protect the data - not the network
- Decentralized authentication rich context (e-mail+)
- Analysis loop for self forming collaborative groups

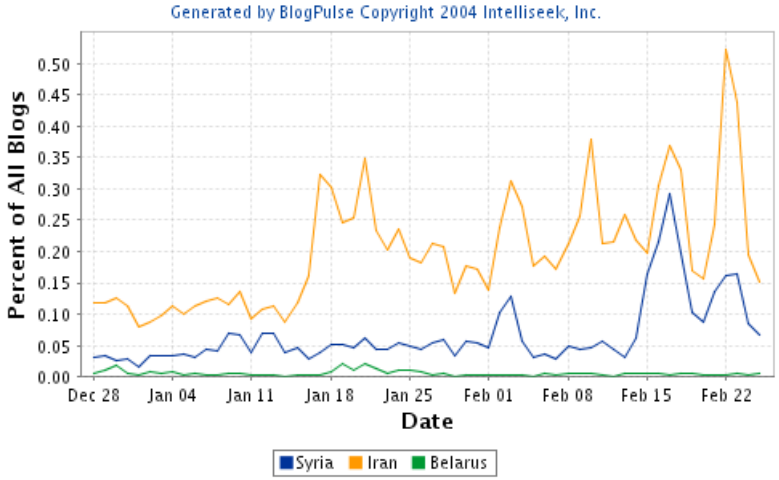
- Groove deployed to initial 50 users
- PIMS ICC's have Groove capability May 05

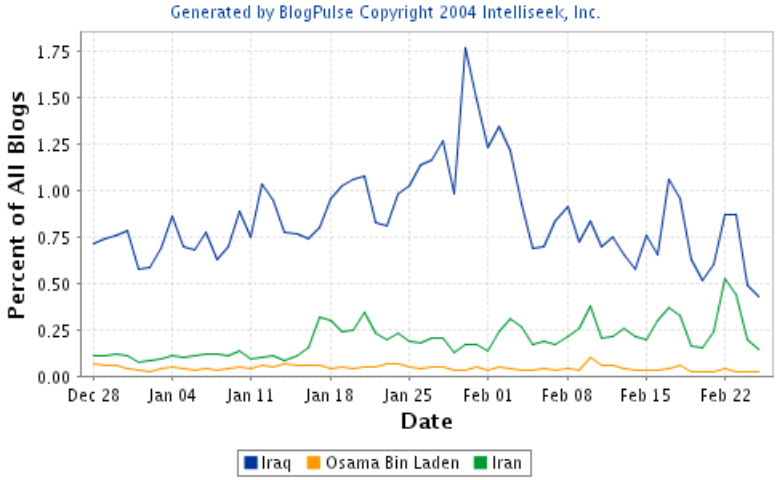
Example Technology – “Blogsphere”

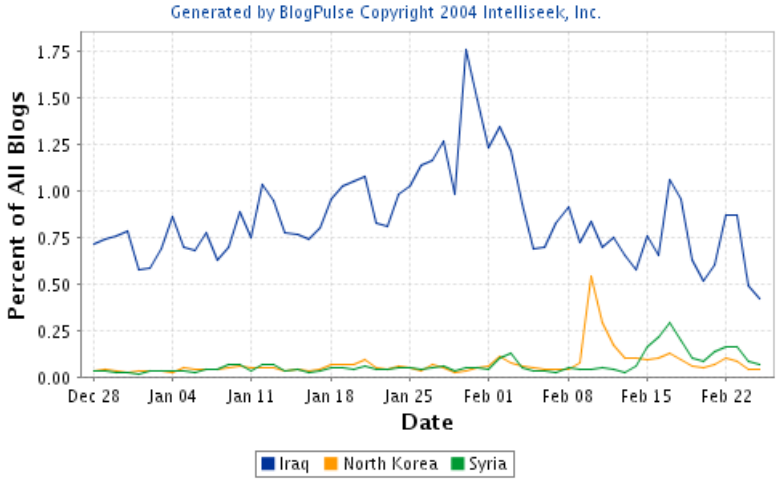
- Simple Web Publishing
- RSS Publish/Subscribe
- Analytics – Path Analysis –Clustering Analysis
- Trend Analysis

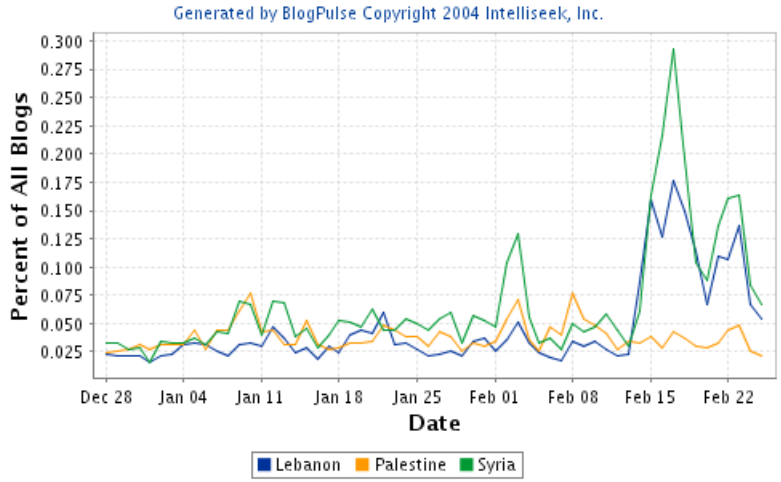
- PIMS has deployed basic Blogging, RSS, and Content Management collaboration platforms in an internal environment
- Expansion in support of communities of practice August 05
- Analytics/Visualization engines under evaluation

Interaction Trend Analysis – “Blogsphere”





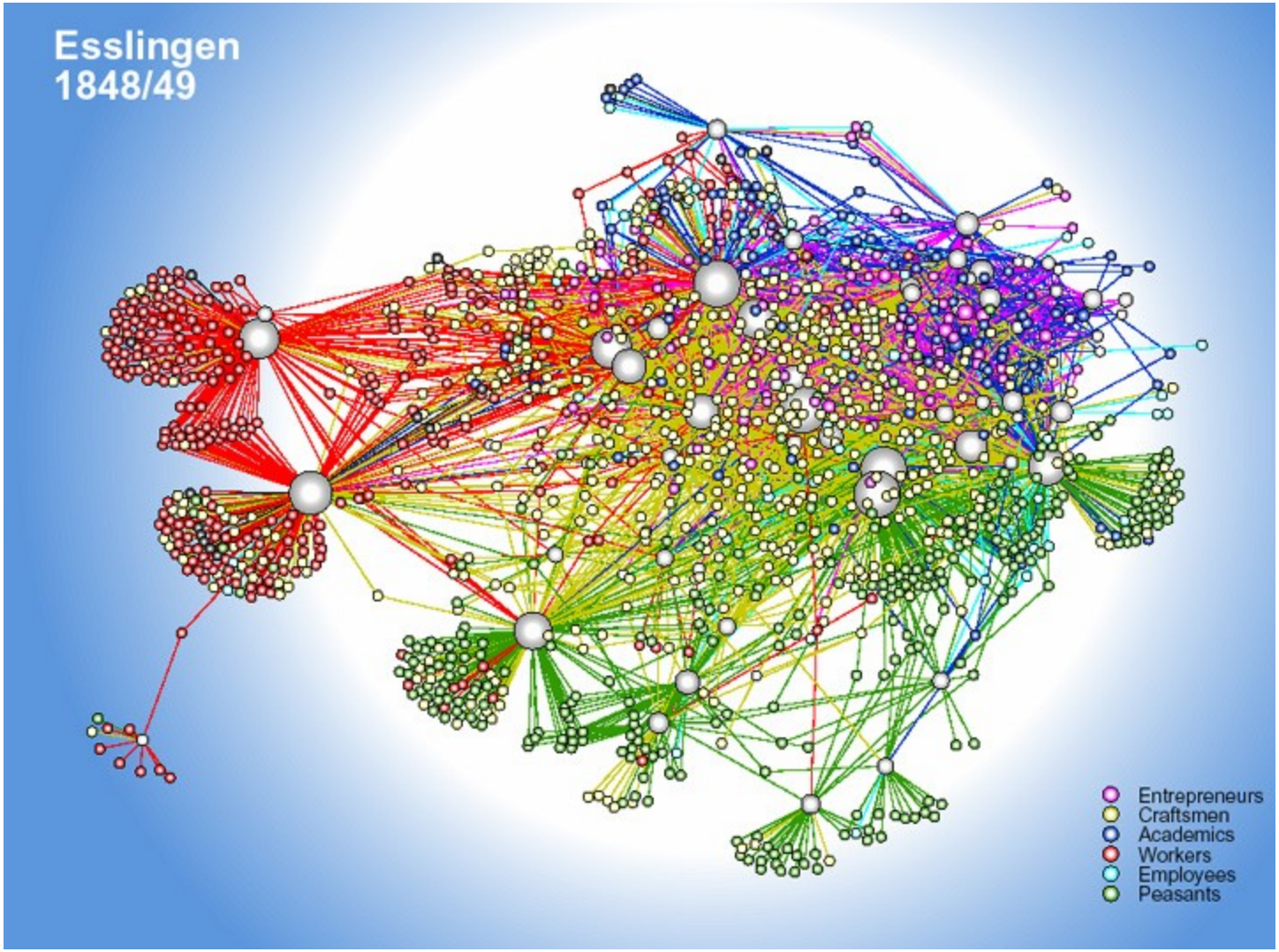




Social Network Analysis

- Based on analysis of interactions and information linkage patterns
- Path Discovery (Small World)
- Clustering Analysis

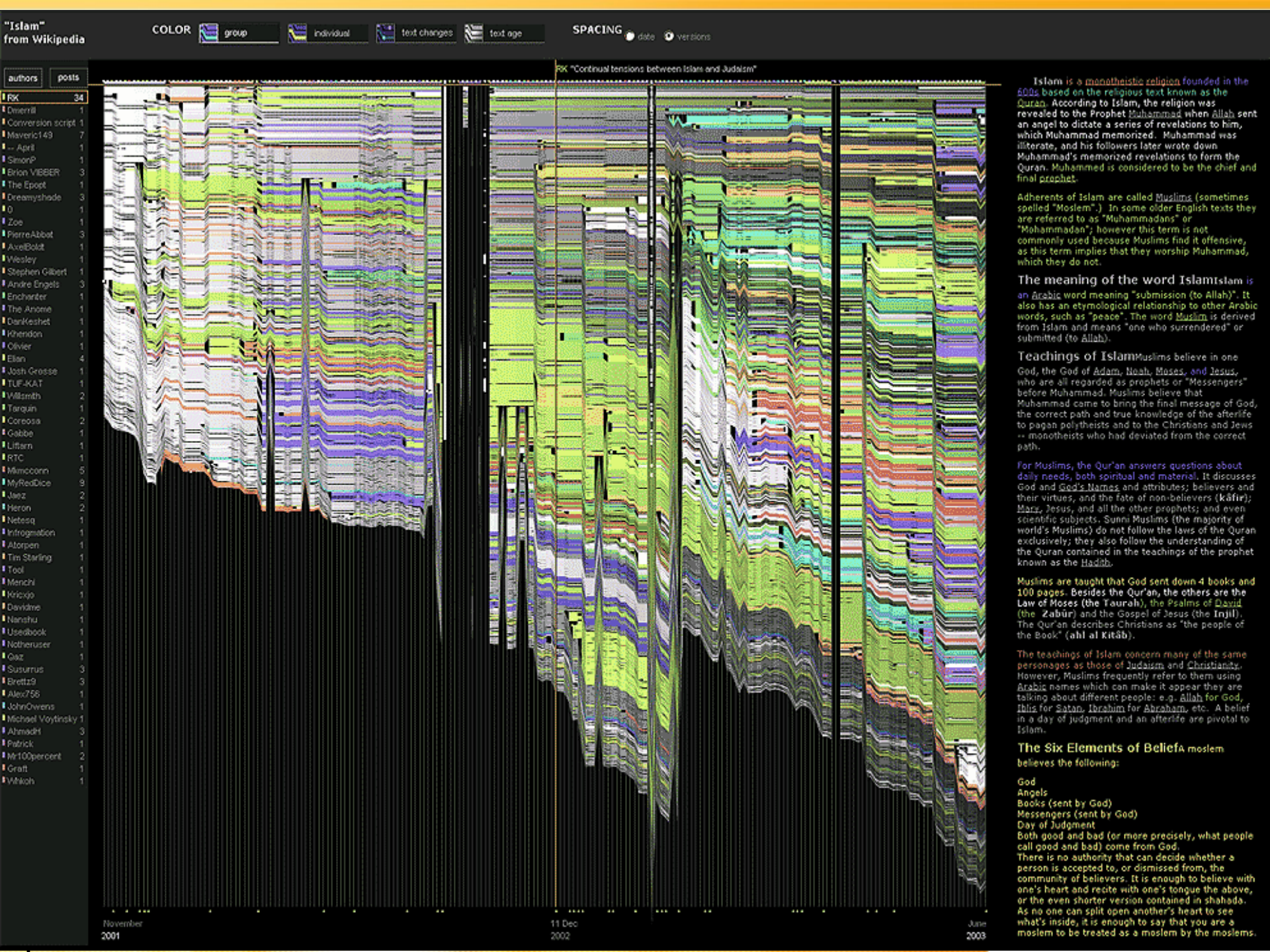
Social Network Analysis



Example Technology WIKI and History Flow

- Decentralized Content Management
- Self Referential Emergent Content Structure
- Emergent Expertise and Community Models
- Visualizations and Intelligence about Community
- Sustainability – dispersion of effort
- ROI (Return on Investment)
- Unstructured Data

- PIMS Wiki rolled out Feb 05 and growing
- http://pimswiki.org



Islam is a monotheistic religion founded in the 600s based on the religious text known as the Quran. According to Islam, the religion was revealed to the Prophet Muhammad when Allah sent an angel to dictate a series of revelations to him, which Muhammad memorized. Muhammad was illiterate, and his followers later wrote down Muhammad's memorized revelations to form the Quran. Muhammed is considered to be the chief and final prophet.

Adherents of Islam are called Muslims (sometimes spelled "Moslem".) In some older English texts they are referred to as "Muhammadans" or "Mohammadan"; however this term is not commonly used because Muslims find it offensive, as this term implies that they worship Muhammad, which they do not.

The meaning of the word Islam

Islam is an Arabic word meaning "submission (to Allah)". It also has an etymological relationship to other Arabic words, such as "peace". The word Muslim is derived from Islam and means "one who surrendered" or submitted (to Allah).

Teachings of Islam

Muslims believe in one God, the God of Adam, Noah, Moses, and Jesus, who are all regarded as prophets or "Messengers" before Muhammad. Muslims believe that Muhammad came to bring the final message of God, the correct path and true knowledge of the afterlife to pagan polytheists and to the Christians and Jews -- monotheists who had deviated from the correct path.

For Muslims, the Qur'an answers questions about daily needs, both spiritual and material. It discusses God and God's Names and attributes; believers and their virtues, and the fate of non-believers (**kāfir**); Mary, Jesus, and all the other prophets; and even scientific subjects. Sunni Muslims (the majority of world's Muslims) do not follow the laws of the Quran exclusively; they also follow the understanding of the Quran contained in the teachings of the prophet known as the Hadith.

Muslims are taught that God sent down 4 books and 100 pages. Besides the Qur'an, the others are the Law of Moses (the Taurah), the Psalms of David (the Zabūr) and the Gospel of Jesus (the Injil). The Qur'an describes Christians as "the people of the Book" **(ahl al Kitāb)**.

The teachings of Islam concern many of the same personages as those of Judaism and Christianity. However, Muslims frequently refer to them using Arabic names which can make it appear they are talking about different people: e.g. Allah for God, Iblis for Satan, Ibrahim for Abraham, etc. A belief in a day of judgment and an afterlife are pivotal to Islam.

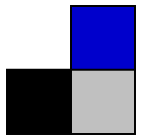
The Six Elements of Belief

A moslem believes the following:

God
Angels
Books (sent by God)
Messengers (sent by God)
Day of Judgment
Both good and bad (or more precisely, what people call good and bad) come from God.
There is no authority that can decide whether a person is accepted to, or dismissed from, the community of believers. It is enough to believe with one's heart and recite with one's tongue the above, or the even shorter version contained in shahada. As no one can split open another's heart to see what's inside, it is enough to say that you are a moslem to be treated as a moslem by the moslems.

Example - Taxonomy

- Ethno-classification or Folksonomy
- Delicious and RSS
- Clustering analysis



- SPAWAR Europe has built a bottom up classification and RSS capability for Sharepoint on another program
- Basic functionality wrapped into portal capabilities to be deployed in 6 to 9 months on PIMS

Taxonomy Profile

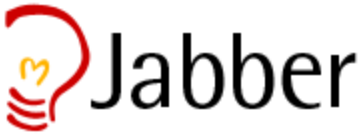
Example Technology - CALDAV

- XML standard- ical
- Descriptive data transformations
- (from closed i.e. Outlook to open and round trip)
- XML over the cloud Pub-Sub for calendar data
- REST style interfaces
- Integration with RSS

- Proof of concept prototype built
- Hardening, Integration, and Productization – 6 to 9 months

Example Technology - Jabber

- Presence
- Publish Subscribe Data Streams
- Extensible XML based messaging infrastructure

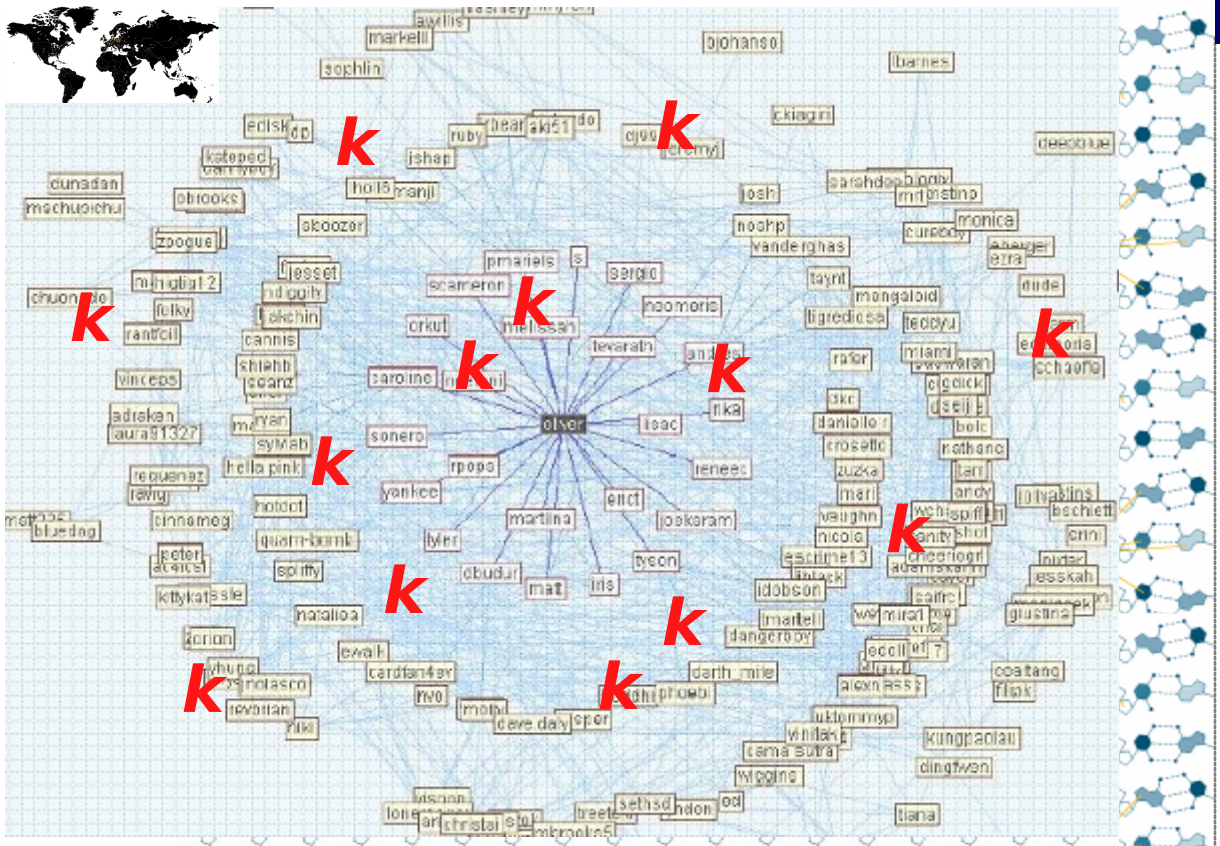


- Deployed in internal test environment
- Deployment for ICC’s in near future
- Basic Pub/Sub Services 6 months
- Integrated Portal capability 6 to 9 months

Example Technology - Jabber

http://ralphm.net/world

PfP Knowledge Grid (PKG)



PfP Collaborative Web Services (PCWS)

MediaWiki
Because ideas want to be free.

CCL+

SharePoint Portal Server 2003

Drupal

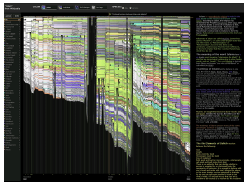
Jabber

VSee

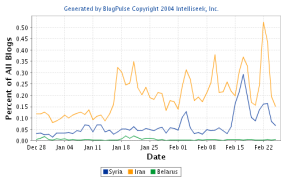
grooveNETWORKS

Derivative Models

Social Networks Clustering and Small World Analysis



Expertise Identification



Information Trend Analysis

Emergent Distributed Taxonomies

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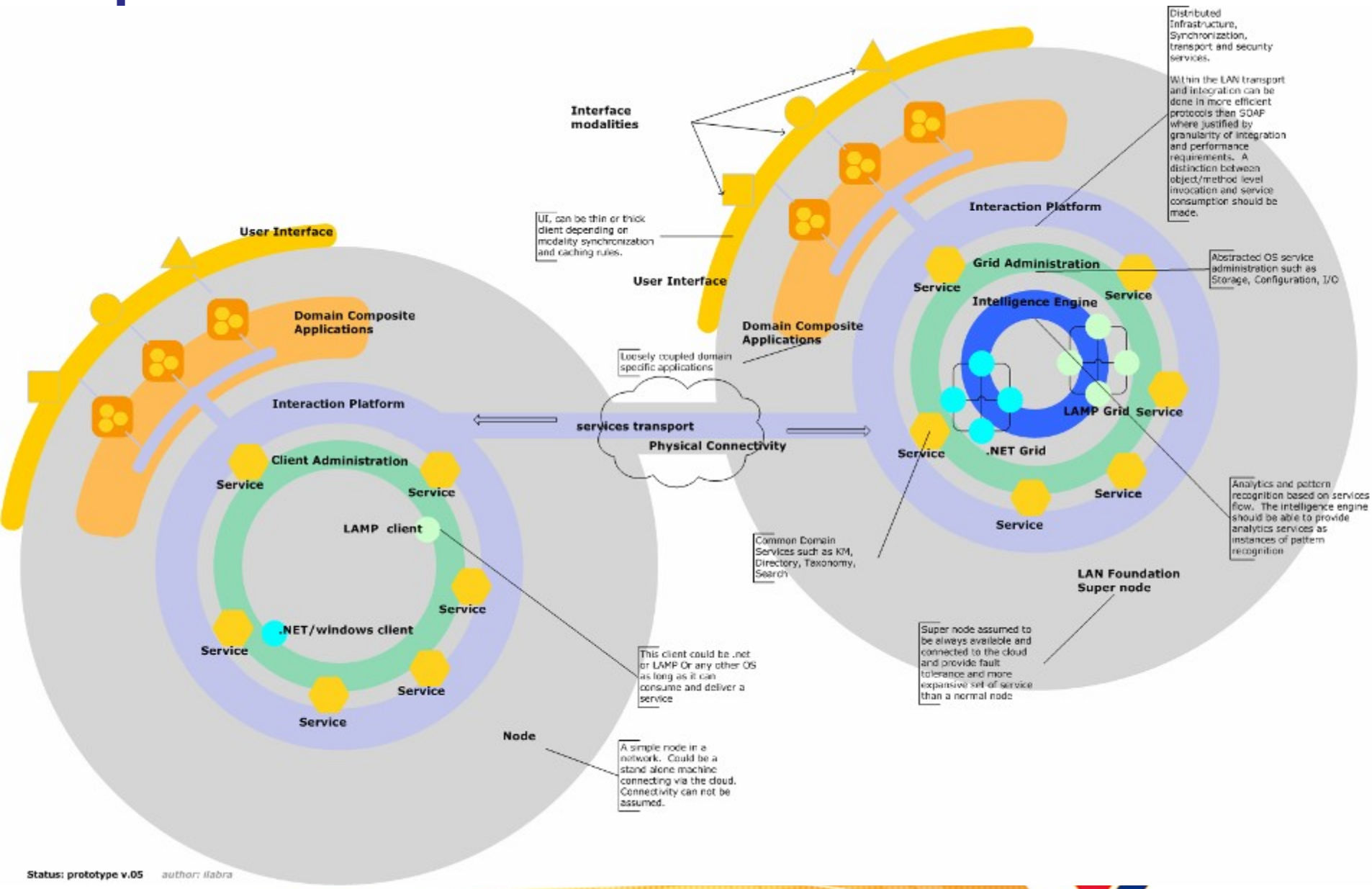
“We need to change not only the capabilities at our disposal, but also how we think about war. Imagine for a moment you could go back in time, and give a knight in King Arthur’s court an M-16. If he takes that weapon, gets back on his horse, and uses the stock to knock his opponent in the head, it’s not transformational. Transformation occurs when he gets behind a tree and starts shooting.”

"...allowing information to be recombined in untold ways and by allowing individuals to interact in unplanned ways creates understandings and options not previously possible"

- Power to the Edge

REFERENCE

Implementation Reference Model



Status: prototype v.05 *author: ilabra*

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REST – Design Pattern

REST (Representational State Transfer)

- Client-Server: a pull-based interaction style: consuming components pull representations.
- Stateless: each request from client to server must contain all the information necessary to understand the request, and cannot take advantage of any stored context on the server.
- Cache: to improve network efficiency responses must be capable of being labeled as cacheable or non-cacheable.
- Uniform interface: all resources are accessed with a generic interface (e.g., HTTP GET, POST, PUT, DELETE).
- Named resources - the system is comprised of resources which are named using a URL.
- Interconnected resource representations - the representations of the resources are interconnected using URLs, thereby enabling a client to progress from one state to another.
- Layered components - intermediaries, such as proxy servers, cache servers, gateways, etc, can be inserted between clients and resources to support performance, security, etc.

Interesting Notes

Lucas Gonze warns me that some things I find compelling -- that 99% of the ill-formed blogosphere can be made well-formed, that new database engines can mine and reconstitute well-formed content in powerful ways -- might not be the big deal I imagine them to be. But Koranteng Ofosu-Amaah suggests that, if this stuff can be made to support and amplify the human network in the right ways, it just might be after all.

Reed's law is the assertion of David P. Reed that the utility of large networks, particularly social networks, can scale exponentially with the size of the network.

The popularity of e-mail was not foreseen by the ARPANET's planners. Roberts had not included electronic mail in the original blueprint for the network. In fact, in 1967 he had called the ability to send messages between users "not an important motivation for a network of scientific computers" ... Why then was the popularity of e-mail such a surprise? One answer is that it represented a radical shift in the ARPANET's identity and purpose. The rationale for building the network had focused on providing access to computers rather than to people. [Abbate]

By focusing attention on centralized delivery of content, the Web may have prevented a proper appreciation of the importance of the often chaotic and generally unplannable point-to-point communications. The Web and the browsers may have played two main roles. One was to force online service providers to accept an open interoperable standard that made the entire Internet accessible for communications for everyone. The other was to introduce a user-friendly graphical interface for e-mail, chat, and netnews, which made such communications easier.

Andrew Odlyzko

Head of the Mathematics and Cryptography Research Departments AT&T Labs